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some instances behaved indifferently toward people who are sensitive to bird killing. This lack of sympathy on the part of the collector may be one factor that has brought him into disrepute. It is to be deplored. To control the thoughtless among collectors it is feasible to devise and enforce regulations, such as one to establish say a three-mile limit around all cities and even villages of a given minimum size. By similar action already taken in some states hunting is prohibited within specified distances of "public grounds." A system of local refuges and parks, where shooting for any purpose whatever would be prohibited, would certainly be approved by most collectors and would go far toward meeting the wishes of other lovers of living birds.

It should not be forgotten that the collecting ornithologist has furnished the bulk of the reliable data upon which our game laws are based, and upon which the economic value of our non-game birds has been established. Furthermore, the training involved in bird collecting can surely be given some credit in several cases of eminent men of science who are now valuable contributors to science in other fields. The making of natural-history collections is useful as a developmental factor, even if dropped after a few of the earlier years in a man's career. Collecting develops scientific capacity; it combines outdoor physical exercise with an appropriate proportion of mental effort, both enlivened with the zest of a most fascinating and at the same time widely suggestive line of enquiry.

As a rule, all collecting adds sooner or later to scientific knowledge, either directly through printed contributions from the collectors themselves, or through the subsequent study of the material by others, often after it has been acquired by some public institution. The ultimate fate of practically all private collections is the college or museum. Very few bird skins, for instance, are destroyed except through fire or other catastrophe. They live on and on, sources of added knowledge and instruction.

In conclusion let me urge that I consider judicious collecting absolutely indispensable

to serious ornithological research along certain important lines, namely, faunistics, systematics, migration, and food studies. There is still an enormous amount of investigation to be done along these lines. Right now progress is perceptibly retarded, because the field of ornithology is being avoided or deserted by the younger students. This desertion is often due to difficulties in the way of securing permits and to lack of encouragement on the part of older men. The legal attitude toward collecting should be revised so as to take in the needs and proper demands of the collector, as well as those of the sportsman.

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THE SCIENTIFIC TREND IN SECONDARY SCHOOLS

A MISCONCEPTION regarding the trend in secondary education seems to have been incorporated in recent educational opinion. From the first citation¹ below, there is quoted the following (p. 80) referring to Mr. Fisher's article.²

We note, therefore, the phenomenon of a decline in the ratio of students who elect science.

There can be no doubt that there has been a decline in the percentage of students electing physics, chemistry, physiography and physiology, as Mr. Fisher's graph shows, but that we are to conclude from these data that there is a decline in the sciences and an increase in the humanities is not so certain. It is quite possible that this decline in the enrolment in these subjects is explained by the shift of students with scientific interests to other subjects like botany, agriculture, domestic science, et cetera. Or it is conceivable that while the enrolment may decline, the length of time devoted to each subject is so in-

¹ Report of U. S. Commissioner of Education, 1913, Chap. V., "The Status of Secondary Education."

² "The Drift in Secondary Education," Willard J. Fisher, *SCIENCE*, November 1, 1912, N. S., Vol. XXXVI., No. 931.

creased that the total time devoted to it by all students remains a fairly constant factor. Combining the data for the sciences, the classics, the mathematics, the history and the English in the table from which Mr. Fisher obtained his data, namely, the "Summaries," on p. 1141 of the Commissioner of Education's "Report for 1910," we get the graph shown in Fig. 1 of this article. The lines

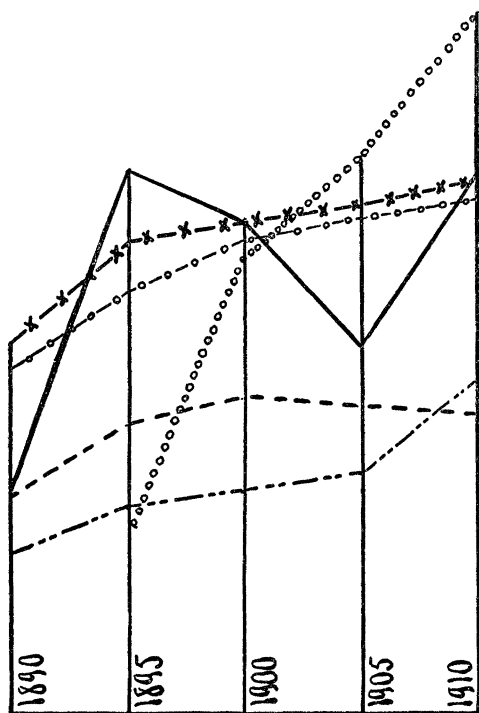


FIG. 1. Diagram shows percentage of total high-school enrollment in U. S. taking courses in mathematics —x—; foreign languages —o—; science —; classics — — —; history — · · —, and English · · · ·. Data from tabulation, page 1,141, Report U. S. Commissioner of Education, 1910. 1 mm. = 1.2 per cent.

show the percentage of students taking these various subjects during the period of years from 1890 to 1910, inclusive. As far as the sciences, as a whole, go, it is evident that the data show that the enrolment in the sciences has increased much more rapidly than the enrolment in the classics and more rapidly than anything else in the tabulation except the

English. I am aware that this conclusion is probably as unjustifiable as Mr. Fisher's because the data for the sciences are incomplete and the apparently erratic rise of the science line is due to the continued introduction of new data. Botany, zoology, agriculture and domestic science are apparently only of sufficient importance in recent years in the high-school curricula to have their enrolment reported. Yet the table gives the impression that the decline in physics, chemistry, et cetera, is due to the shift of students to these newer subjects.

I have examined with interest later reports of the Commissioner of Education to see if they confirm or contradict the conclusion to which Mr. Fisher comes, namely, that the sciences are declining in popularity with high-school students and that the humanities are constantly increasing their percentage of enrolment, but with the report of 1910 the commissioner ceased to print a statement of the enrolment in the various subjects, evidently appreciating the fact that such data, in the form in which they had been given, are more or less inconsequential. There is continued, however, the report of those graduates of public and private high schools who are preparing for college and who elect either the classical or the scientific course. These data are shown in Fig. 2. The first part of the chart gives the

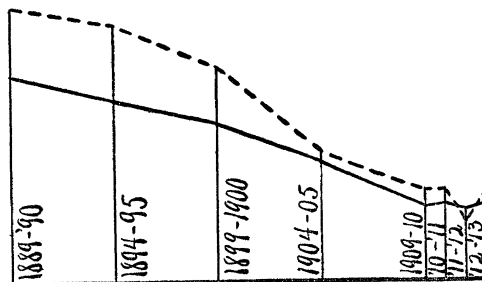


FIG. 2. Diagram shows percentage of high-school students going to college who select classical — — — and scientific — courses. 1 cm. = 2.7 per cent. —.

data for five-year periods; the latter part for yearly periods. Both the dotted line representing the percentage of classic students and

the solid line showing those in science are declining, indicating that the percentage of high-school students who go on to college is constantly diminishing, but, in so far as the graph throws light on our problem, it indicates that classical studies, among high-school graduates intending to go on to college, have been growing in disfavor more rapidly than the scientific.

The apparent increase, the country over, in the enrolment in Latin, and the decrease in physics, chemistry, physiology, et cetera, may be due to such changes in restricted regions which are not standing in a position of educational leadership. Such, I think, is the case, and hence I do not believe that the data Mr. Fisher uses can show the *trend* in modern secondary education. In the first place, the great increase in public high-school enrolment has been in the rural high schools. The sort of course in vogue there will determine, therefore, in large measure, the increasing enrolment in the various subjects. Mr. Fisher's second chart indicates that the percentage of population in public high schools has increased much more rapidly than the population of the United States, but that the rate of increase in urban high schools has been very slow. In other words, the drift which his figures might show is a drift that is found in the rural high schools. From 1890 to 1913 the percentage of the rural population (in cities of less than 8,000) attending the rural high schools has risen from 0.15 per cent. to 1.40 per cent., while the percentage of urban population in urban high schools has only risen from 0.74 per cent. to 1.47 per cent. In 1890, the enrolment in rural high schools was only half (50.4 per cent.) of that in city high schools; in 1913 it was 11 per cent. greater. We should hardly look to the rural high schools, which have been established in such numbers in the last decade or two, to set the pace in educational matters. The trend in education would be much better indicated by the movements in the larger high schools and in the more progressive states. In the second place, in the decade from 1900 to 1910, 59.5 per cent. of the increase in high school attendance was

in the North Atlantic states, a region still under the dominance of classic ideals in its smaller high schools. This fact would tend to make any reports including these figures show a dominance of the classics. Thus in Connecticut³ the number of students pursuing various branches is given as follows: Modern language, 7,586; Latin and Greek, 5,947; mathematics, 12,070; literature, 21,429; science, 6,876. In Ohio, however, the figures are: modern language, 53,681; Latin, 45,023; mathematics, 200,875; literature, 61,755; science, 489,412.⁴ Yet one would hardly even accuse New England of leading secondary education away from the sciences to the humanities.

The Ohio State Report (1913) gives comparative figures (p. 13) for a much shorter period than the U. S. Commissioner. I give them herewith for 1909 and 1913.

	1909	1913
Science	467,668	487,974
Latin	42,765	45,023
English	747,813	756,009

The data for New Jersey can be given only for the last two years.

	1912	1913
Science	17,509	22,478
Latin	15,003	13,147
English	28,540	32,230

These citations are not selected. Reports were requested from what seemed a fair sample of states, namely, N. H., Vt., Mass., Conn., N. Y., N. J., Pa., Ohio, Mich., Minn., Ia., Va., Md., Ky., Ga., Ore., Cal. The ones cited are the only ones among these which gave the desired information.

Not many of the states furnish, for a period of years, data regarding the enrolment in various subjects in the high schools. I give herewith the graph (Fig. 3) of the state of Minnesota, showing the percentage of the total enrolment in science, Latin and English. The percentage in mathematics and in the history group has remained at about the

³ P. 228, "Report of the State Board of Education," 1910-11.

⁴ Ohio School Report, 1913, p. 70-73.

same level. Minnesota will be free from the conservative classic tendencies of New Eng-

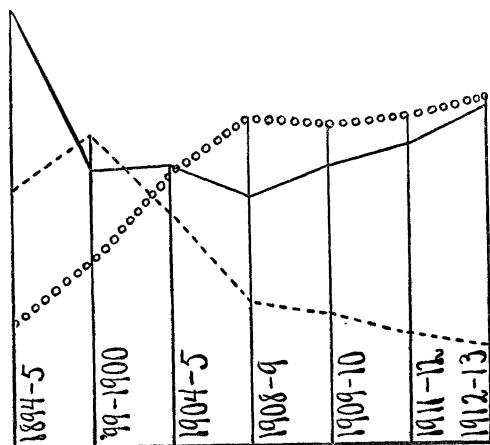


FIG. 3. Diagram shows the percentage of total high-school enrollment of Minnesota taking courses in science —, Latin - - - and English o o o. 1 cm. = 3.5 per cent.

While these figures are all significant the enrolment in a given subject does not indicate the relative amount of time which is devoted to it. The enrolment, for instance, in a science might be the same as in Latin, but the science might continue only for a single semester while the Latin continued for the year. It would be possible, then, to measure the interest in a science group as compared with a language group only when the enrolment is expressed in commensurate terms.

I have had the opportunity recently to examine the records of the high school at Galva, Illinois. During the time covered by the graph given below (Fig. 4) the superintendent of schools has remained unchanged. No sudden change in the administration has, therefore, affected the curve. The enrolment has been figured in student-weeks. Thus, if twenty students take Latin for twenty weeks, the registration of the class would be consid-

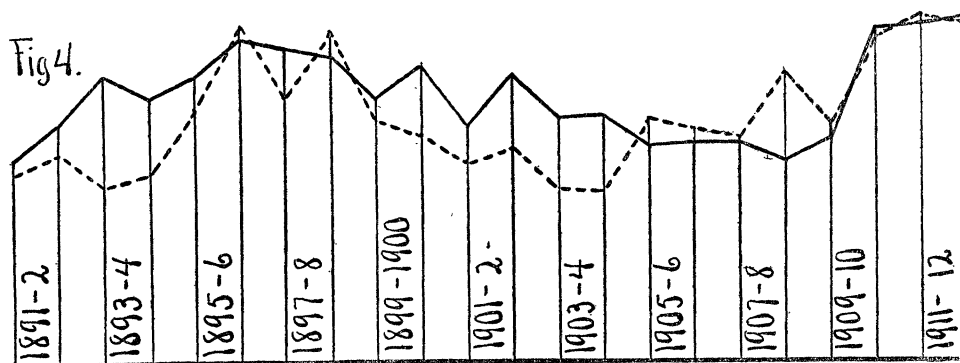


FIG. 4. ENROLLMENT IN SCIENCE — AND LATIN - - - in the Galva, Ill., High School, expressed in student-weeks. 1 mm. = 33 student-weeks.

land and her rural population has increased less than 10 per cent. in the last decade.

Another bit of evidence comes to hand in the "Report of the Bureau of Research of the Upper Peninsula Educational Association" (Michigan): Not a single high school requires Latin for graduation; three require a language; ten require science, three of these specifying that it must be physics; seven require neither science nor language; six did not report.

ered eight hundred student-weeks. The graph given in Fig. 4 indicates the enrolment in science and in Latin and it is surprising how the two lines parallel each other. This, of course, is for a single school only, but it is the type of study which must settle the question as to the relative interest in science as compared with other subjects.

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